of commerce or industry at home and abroad during the second year. The scheme is a most valuable recognition of the close union which should exist between science and industry, and the late Mr. Gartside has certainly indicated a very useful direction in which others may endow further scholarships. The book now under review represents a report to the electors of the work carried out during the period of the scholarship.

A comparison of the development of the coal-tar colour industry in Germany and this country has been so frequently made to the great disparagement of English enterprise and educational methods, that very properly this branch of the subject was not further investigated by the author, his work being concerned with the application rather than the manufacture of dyes. The fact that in the main we hold our own against all competitors in the dyeing and printing industry is brought out very clearly. In Germany the dye-houses are, with few exceptions, smaller, and the methods less scientific, than in the large centres of the industry in England, such as Manchester and Bradford; and in handicraft skill the English dyer is perhaps unapproachable. The great volume of dyeing done in the United States appears to be chiefly due to the large and rapidly increasing demand made by the home market, and the competition of America in foreign markets is comparatively insignificant in this branch of trade. Moreover, in most of the principal dye-houses in New England the managers and foremen are British. The distribution of trade is, however, a matter of very delicate balance, and the fact that Germany has almost the monopoly of the manufacture of coal-tar dyes may easily result in the transfer to her of the leading position in the dyeing industry.

The coal-tar colour industry is, in fact, one of Germany's greatest industrial assets, and apart from its directly profitable character it has also been of the greatest importance as the mother of many new industries, such as those of synthetic pharmaceutical products, liquid chlorine, anhydrosulphuric acid, &c. The requirements of the industry have also reacted largely on the standard and character of the instruction given in the German universities and colleges, and, most important of all, have been a great object-lesson to the German Government and people with regard to the supreme importance of science in industrial life. This has again reacted in the direction of the more general appreciation and utilisation of technical education in Germany, and has been an important factor in inducing the Government and local authorities to render assistance in fostering the various industries; a condition of things which, unfortunately, is largely absent in this country.

A great feature of the dyeing trade in England has been the establishment of powerful trade combinations, whereas the industry has not developed along these lines in Germany or in America. It is undoubtedly true that when efficiently managed these large associations lead to great economies in such directions as the concentration of work, improvement of equipment, and better conditions for buying and selling. Operations conducted on a large scale can be carried on more cheaply and more profitably than is possible by a large number of smaller producers. Consequently, both workman, employer, and consumer should benefit. On the other hand, the danger of the misuse of great concentration of power is well known, and experience has yet to show whether the condition of an industry controlled in this manner is as stable and permanent as when competition and individual enterprise have freer scope.

Turning to a more definite criticism of the work under review, it undoubtedly forms very interesting reading if not examined too closely as regards technical accuracy. The material is arranged under the following headings :—cop dyeing, sulphur colours and indigo, mercerising, bleaching, the industry in the United States, conditions of life in the industry, efficiency of the industry, colour production. It could not reasonably be expected that the author would be able to show a profound knowledge of present-day practice in all branches, and it would not be fair to criticise the book from this standpoint. It must rather be considered as the statement of an organised series of observations made by a trained mind upon a subject of which the observer has some special knowledge. If read with this in view, the book will be found most interesting and valuable. The author has made excellent use of the great facilities placed at his disposal, and has done much to justify the idea of the founder of these scholarships that they would be of value, not only to the individual, but to the trade of the country. In conclusion it must be said that the literary style and even the grammar and punctuation of the subject-matter are open to much more criticism than is desirable in a book issued with the imprint of a university. The idea that a careless use of the English language is permissible in books dealing with technical subjects is one to which too strong exception cannot be taken.

WALTER M. GARDNER.

PERSONAL HYGIENE.

The Care of the Body. By Dr. Francis Cavanagh. (The New Library of Medicine, edited by Dr. C. W. Saleeby.) Pp. xvi+292. (London: Methuen and Co., n.d.) Price 7*s.* 6*d.* net.

THIS book belongs to the excellent "New Library of Medicine" series issued by Messrs. Methuen. In the series, as planned, all the great aspects of "preventive medicine" are dealt with from many standpoints. In "The Care of the Body" Dr. Cavanagh handles in a very popular yet fundamentally scientific way the leading generalities of personal bodily hygiene —sleep, baths, exercise, training, fatigue and massage, clothing, skin, hair, teeth, feet and hands, light, eye, ear, nose. Each of these has a chapter. The volume is completed by chapters on position, habit, and the functions of the physician. The style is breezy and rapid. It is well adapted to the lay reader, who more easily acquires casual than rigidly ordered knowledge. But Dr. Cavanagh indicates in every page an easy familiarity with the latest science at the moment when apparently he is most exuberant in his verbal flow.

The method has its dangers, for it may give currency to vague and inexact doctrines. But here the sparkle of the writing secures the interest without impairing the science. Health is undefined, but the problem of health is mainly how to maintain the fight against malign environment, and "fitness" is largely the capacity to master hostile germs. The discussion of sleep adapts scientific theory to practice, and has many sound hints Of the cold bath it is said, "In general, the value of a cold bath is in inverse proportion to its length" (p. 39). Of exercise, the view is that "all mental processes are based upon a simple unit of action or process, in which some one muscle-fibre is a chief factor" (p. 55). Play is preferred.

The criticism of current superstitions as to exercise and training is pointed and conclusive. The cardinal point is the relation of exercise to diet. Dr. Cavanagh is somewhat dogmatic (p. 60) on the intellectual training of women. He assumes too readily that accepted intellectual standards are a true test of mental capacity even in men. In exercise, walking and running, not any artificial system, are fundamental. "Muscles are not meant to work or be developed individually" (p. 78).

The discussion of fatigue is highly general, but adequate for its purpose. Of clothing a good deal is said in detail, the principle being that "man is homoiothermal," and 98°·4 Fahrenheit is his normal temperature. Clothing is closely criticised from this standpoint. In the other chapters—teeth, eyes, &c.—many hints of experience are embodied, and, though the main facts are well known, every reader will find them set forth in a fresh and stimulating way. The chapters on position and habit are well loaded with good matter. The last chapter points the view that dominates this book and the series it belongs to, namely, that henceforward the physician's true function is to prevent, not to cure, and the profession should be organised accordingly. Altogether, the author succeeds in his effort to be simple, scientific, and vivacious. The aim of the series is to apply scientific medicine to the informing of public opinion, and this volume, within its range, certainly furthers that aim. If looked-for topics are sometimes omitted, they are likely to be found in other volumes.

OUR BOOK SHELF.

Practical Mathematics. By Prof. John Perry, F.R.S. Pp. 183. (London: Wyman and Sons, Ltd., 1907.) Price 9*d*.

THE first edition, a slim little pamphlet price sixpence, was reviewed in these columns about the end of the last century; this new edition begins to show signs of corpulence.

The pamphlet has raised a crowd of imitators, bulky works on engineering and mathematics, workshop arithmetic, and general utilitarian and commercial theory; it would be better, for historical interest, to preserve its original size.

The author has forced the Mathematical Tripos to adopt the Slide Rule for numerical computation; and would do well to follow up by a description of the Hospitalier notation of writing derived units, as ft.^{2} and ft.^{3} for square and cubic feet, lb./ft.^{2} for pressure, and so on; no need then for the mathematical Esperanto suggested some years ago.

The slide-rule hint—"practise with simple numbers"; "ask no one to help you"—should be followed by arithmetical exercises intended to show the learner how to discover the use for himself: such as cube 2, 3, 4, . . . and then extract the cube root; better then to discard all rules, as they can always be re-invented with greater ease than recollected. Considering that the slide rule and logarithm table work to the base 10, the definition of the logarithm in § 8 is $-n=\log N$, if $10^n=N$; not $a^n=N$, which is confusing by its useless generality.

The practical student Prof. Perry has in view is called upon to work and act, but not to write and explain. His geometry is so very easy, consisting in drawing a few lines by instruments. But if required to give an explanation he would find himself compelled to give six lines or more of tedious definition to one line of demonstration; he would become Euclidean without knowing it.

The author enjoys attacking the schoolmaster, who shows certainly many weak points of inherited prejudice. Prof. Perry looks at geometry from the point of view of everyone becoming an engineer in his turn; the schoolmaster deals with very few students of that class, and can make out a very good case for Euclid; Greek in Euclid and Euclid in Greek; and he has an answer ready for the question in the note on p. 8—"Why not say—*delogarize?*"—Because the word is a mongrel.

La Théorie de la Physique chez les Physiciens contemporains. By Abel Rey. Pp. vi+412. (Paris: Félix Alcan, 1907.) Price 7.50 francs.

RECOGNISING the serious discordance between the views of contemporary physicists upon the true meaning and value of physical theories, the author of this interesting book inquires whether this conflict of opinion justifies the contention of the anti-intellectualist philosophers that such theories are purely arbitrary constructions leading, not to completer knowledge of the world, but merely to more effective practical control of its course. M. Rey proceeds by an able cross-examination of actual scientific thinkers, classifying them by reference to their attitude towards the post-Newtonian mathematical physics—which assumed the actuality in detail of the molecular machinery that it invoked to explain phenomena.

In his first group fall Rankine, Mach, Ostwald, and Duhem, who agree in rejecting the ontological pretensions of the mechanical theory and in conceiving the various departments of physics as autonomous sciences connected with one another and with mechanics by the notion of energy. British readers will be gratified by the importance which the author attaches here to the work of our countryman—whom he regards as the father of the critical movement—and will welcome his clear account of the views of the brilliant professor of Bordeaux. Next to these M. Rey places Poincaré as a critic who corrects rather than rejects the traditional doctrine, accepting its belief that the data of observation in physics are the product of the superposition of an infinite number of elementary phenomena to which the differential equations of theory refer, but recognising that its conception of these phenomena as molecules in movement is only a description in one idiom of objective relations that could equally well be rendered in another. Last come the physicists (including most of the British school) who have lost the confidence of the post-Newtonian mechanists rather than their ideals; who still hold that physical phenomena can be explained by the conceptions of